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Original article

Active learning improves nursing student clinical performance in an academic institution in Macao[☆]Cindy Sin U Leong^{a,*,1}, Lynn B. Clutter^{b,1}^a School of Health Sciences, Macao Polytechnic Institute, Macao 999078, China^b School of Nursing, College of Health Sciences, The University of Tulsa, Tulsa, OK 74104-9700, USA

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ABSTRACT

Objective: To assess the outcome of the application of active learning during practicum among nursing students using clinical assessment and evaluation scores as a measurement.**Methods:** Nursing students were instructed on the basics of active learning prior to the initiation of their clinical experience. The participants were divided into 5 groups of nursing students ($n = 56$) across three levels (years 2–4) in a public academic institute of a bachelor degree program in Macao. Final clinical evaluation was averaged and compared between groups with and without intervention.**Results:** These nursing students were given higher appraisals in verbal and written comments than previous students without intervention. The groups with the invention achieved higher clinical assessment and evaluation scores on average than comparable groups without the active learning intervention. One group of sophomore nursing students (year 2) did not receive as high of evaluations as the other groups, receiving an average score of above 80.**Conclusions:** Nursing students must engage in active learning to demonstrate that they are willing to gain knowledge of theory, nursing skills and communication skills during the clinical practicum.© 2015 Shanxi Medical Periodical Press. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Nursing students in Macao are educated in a 4-year baccalaureate program, and students are required to participate in a clinical practicum annually. Clinical preceptors prefer nursing students to ask questions and seek answers when they are unsure of information and then report on the results of their search. In addition, the nursing education program subscribes to the current philosophy of lifelong continuing education.^{1,2} Beginning in 2012, all nursing students graduating in Macao will receive a four-year bachelor's degree. Due to aging of the population worldwide, the number of nursing staff is inadequate in Macao to provide care for this growing segment of the population and their increased needs for health care and nursing services. Thus, additional nursing students are needed to be trained as qualified nurses. Recently, the

government has begun to provide additional support to nursing education in the form of tuition subsidies for students and increased salary and benefits for nurses in an attempt to double the number of students enrolled in nursing programs. Consequently, the nursing shortage has been dramatically reduced. However, experienced nurses and clinical preceptors have repeatedly complained that the recent nursing students have not been performing well in clinical practice initially. With the goal of increasing the number of nursing graduates and more interest in becoming a nurse because due to governmental support, the preparedness of the new nursing graduates may have been diminished by the increasing workload for the faculty and preceptors. Faculty has also noted an increase in students who fail the clinical practicum and require remediation. The clinical preceptors have also observed that the current generation of young people, including nursing students, generally lives in peaceful and financially self-sufficient families. In addition, they may have had no siblings to care for and few household chores or experience. These generational changes may also affect the assessments of proficiency of the seasoned preceptor. To address the problem of dissatisfied clinical preceptors and lowered nursing students performance, a qualitative study was performed to determine what

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the clinical preceptors consider to be the most essential elements of clinical practice. This study enabled the clinical preceptors to describe the inadequacies of the nursing students in the clinical practicum, thereby providing the nursing students with a better understanding of what they need to do to improve their performance during their clinical education. Previous research has shown that nursing students need to garner their clinical preceptors' positive evaluation and respect.

However, there may be some controversy over the perceptions of nursing students that "belonging, knowing and receiving affirmation"³ influence professionalism. Clinical preceptors serve as experts in nursing and thus, they are selected as the students' evaluators. They have a high expectancy in nursing students who are required to fully understand the essential elements of knowledge and performance to achieve a satisfactory or passing rating in their clinical practicum. These standards should increase as the student moves through their training and towards the terminal outcomes. The information provided by the clinical preceptors should be collected to offer valuable suggestions to the academic faculty on areas needing more or less instruction. Testing should also focus on these areas for needed growth. The preceptors and academic faculty can work together to improve student performance. Moreover, it is good practice and an expectation that nursing students understand how they will be assessed. Understanding the assessors' requirements for improved performance is integral to improving their practicum scores. Thus, this intentional study may assist the nursing students to better understand the expectations of the clinical preceptors and to begin to regulate their own lifelong learning.

The aim of this pilot study was to explore the areas of greatest concern to clinical preceptors in nursing students in Macao. The results may provide programs with a successful strategy to increase student performance and preceptor satisfaction while the conditions require a greater enrolment and productivity by both groups to achieve staffing needs to meet the increasing demand. The purpose of this study is to provide essential information about active learning among nursing students during practicum in Macao.

2. Material and methods

2.1. Study design

Every semester, students are assigned to rotate to fulfil their clinical practicum and to be promoted to subsequent courses. The participants in this study were frequently reminded to apply the principle about active learning during the practicum. Students were instructed of the philosophy of active learning, including categories of asking questions whenever unsure, requesting to perform various nursing skills, requesting to observe related skilled performances and answering the call button.

2.2. Setting and samples

The subjects of this study were consisted of nursing students who had their clinical practice in wards. In total, 56 participants were included from the same nursing school and under the same academic educator, but with different clinical preceptors. All of the nursing students had graduated from grade twelve and had completed the necessary examinations and interviews prior to enrolment in the nursing program. These nursing students were sophomores, juniors and seniors in the program who were approximately 20 years old (Table 1).

2.3. Ethical consideration

This study was approved by the Management Board of the Research Committee at Macao Polytechnic Institute. Participants were provided with an explanation of the need for active learning during practicum. Participants agreed to provide their informed consent.

2.4. Measurements

This study used clinical assessment and evaluation scores as a measurement to evaluate the outcome of the application of active learning during practicum among nursing students.

2.5. Procedure

The researcher met regularly with the nursing students before they attended the assigned wards for clinical practice. The researcher is also an academic educator who supervises the nursing students in the wards as described above. During the clinical briefing, the importance of active learning was explained to the nursing students in these five groups. The five groups began their practicum at different times, beginning in mid-September. During the supervision of the nursing students in different wards from year 2 to year 4, the students were frequently reminded to engage in active learning during the clinical practice. During year 4, senior nursing students participated in one-week intensive experiences of clinical practice in each of the three wards, which closely resembled their beginning assignments as new graduates. Each group undertook the practicum following completion by the previous group. One group of year 3 junior nursing students completed the practicum in two wards for six weeks and then returned for additional classroom instruction prior to their progression into their fourth year experiences. The second group of year 3 students undertook their practicum in critical care and then began clinical practice in the surgical (digestive) ward. Year 2 sophomore nursing students completed their practicum and returned to class for theory learning.

2.6. Data analysis

Final clinical evaluations were averaged and compared between groups with and without the intervention.

3. Results

All 5 groups of students obtained high scores on the clinical practicum, with an average score of 95, (See Table 2), except in the medical and surgical wards where the nursing students must provide routine caring similar to the staff. The detail of the give in scores for all five groups was arranged by year 2–4 in order shown in Table 2. The assessments and evaluations were highly demanding. The comments written by the clinical preceptors provided an appraisal of the nursing students' implementation of active learning.

The first and second groups included year 4 participants who had 3 weeks of intensive clinical practice in three different wards. Three clinical preceptors from these wards evaluated these students positively. When the students reached the end of the practicum, the preceptors reported that these students were highly active in the learning process, asking questions when they were unsure about specific issues. The students were also highly active in their requests for demonstrations of nursing skills. They also answered the patients' call button and were able to effectively work with terminal cancer patients with complex and demanding

Table 1
Participants.

Participants	Wards						
	Medical (respiratory)	Medical (neurology)	Palliative	Critical-care (cardiology)	Surgical (digestive)	Critical-care (operation)	Medical (digestive)
	1-preceptor	1-preceptor	1- preceptor	2-preceptor	2-preceptor	2-preceptor	2-preceptor
Year 4 Group 1 (5-female & 1-male)	✓	✓	✓				
Year 4 Group 2 (5-female & 2-male)	✓	✓	✓				
Year 3 Group 3 (5-female & 1-male)				✓	✓		
Year 3 Group 4 (5-female & 1-male)				✓	✓		
Year 2 Group 5 (4-female & 2-male)						✓	✓

Table 2
Comments and scores for the participants.

Wards	Scores (average score given by the clinical preceptors)	Comments (active behaviour)	Quotes some examples of the clinical preceptor's comments
Medical (respiratory)	>95	Excellent	Very happy to see the nursing students request to perform nursing skills, such as IV therapy. (Group 1 and Group 2 of Year 4)
Medical (neurology)	>95	Excellent	Students are very active in learning and asking questions. (Group 1 and Group 2 of Year 4)
Palliative	>95	Excellent	Able to communicate with a 'difficult' patient who was unwilling to step out of his room. Even the nursing staff could not achieve this task. (Group 1 and Group 2 of Year 4)
Critical-care (cardiology)	>93	Excellent	I found that I needed to review my books to determine the rationale for particular procedures. These students were very active in their learning, asking questions when unsure and searching for the answers for me. (Group 3 and Group 4 of Year 3)
Surgical (digestive)	>80	Excellent	This group (Group 3) of nursing students was better than I at knowing how to ask questions. They are very detailed, as mentioned by a nurse who is under specialist training. (Group 3 and Group 4 of Year 3)
Critical-care (operation)	>95	Excellent	This group (Group 3) of students was quite good and very active in asking questions and requesting opportunities to perform the skills. This group (Group 4) of students was better than groups that I have mentored in the past. This group gives more active effort, although they were already doing well. (Group 3 and Group 4 of Year 3)
Medical (neuro and digestive)	>80	Excellent	They were very well prepared for the questions about the surgery that I had discussed with them yesterday; they could answer my basic questions. (Group 5 of Year 2)
			For the entire group, active learning was performed, and I could see that they have the "heart" to learn and to become nurses, not just because of the good income. (Group 5 of Year 2)

requirements. These students actively participated in communication with the terminal patients and helped the patients to express their feelings. In one example, the students taught a kidney cancer patient how to make paper art for the patient to give something to express his gratitude to his family.

Year 4 participants were hardworking and exhibited more active learning compared with previous students. They also returned more frequently than prior groups to the school's laboratory to practice nursing skills, such as drawing blood and changing dressings after they had completed the practicum and subsequently performed the techniques for the researcher's comments. The clinical preceptor also described that the group of students stayed behind and provided a haircut for a patient who was in terminal status and could not visit a barbershop. The students' performance was evaluated as 95/100 on average.

The third and fourth groups were year 3 participants who spent 2 weeks in the critical care ward and 4 weeks in the surgical (digestive) ward. The preceptors for these two groups in the critical care areas were very pleased with the students' active learning, noting that the students actively sought answers to

questions when they were unsure. The third group preceptor described that he even needed to search for information regarding the rationale behind the specific methods. During the last day of the practicum, an oral examination was performed by the clinical preceptor and the students' academic educator (researcher). All of the students were able to answer the questions. Due to care evidence or clinical techniques procedure the preceptor of the fourth group mentioned that she needed to revise her knowledge of techniques before and during her mentorship of this group. She was also very pleased and scored the students as "excellent." The two clinical preceptors in the surgical ward were the same individuals. The third group of students was highly praised for their active engagement in the learning process and it was noted that these students requested additional opportunities to perform their new skills. One of the clinical preceptors for the fourth group had many years of mentoring experience, and this preceptor stated that this group of students was much better than previous students. The other clinical preceptor mentioned that the students were also more active participants than previous students in their clinical skills in the practicum.

The fifth group consisted of year 2 nursing students. The first assignment of these students was in the operating room. For the sophomore students, this was their first experience in an acute setting. The results of the evaluations were excellent. The preceptor commented that the students were very active in the learning process, as demonstrated by their efforts to obtain information related to the following day of surgery. The clinical preceptor observed that the students could answer all of her basic questions related to the surgery and nursing interventions for the patients. The students were able to perform sterile techniques, such as hand scrubbing, assisting in putting on the surgical gown and passing sterile devices.

Subsequently, the fifth group proceeded to the medical ward, where their active behaviour related to learning was also positively appraised. The students demonstrated active behaviour by requesting the researcher to observe their nursing skills, such as performing blood draws and intravenous catheter insertions. Two students whose nursing skills were determined to be lacking returned to the school laboratory to practice to ensure improvements in their future performance and preparation for their next practicum.

4. Discussion

Traditionally, clinical preceptors are experienced senior registered nurses or specialist nurses who have been working in a particular ward for many years.⁴ The clinical preceptors interviewed for this study were registered nurses with an average of 10 years of experience. They had a great deal of professional experience in patient care and were familiar with the daily routines and activities of their wards. All of these clinical preceptors had completed and passed basic training courses, which were designed specifically for them. Eighteen of the preceptors had also taken advanced courses. This training prepared them to guide and mentor the nursing students and to educate the students in all areas, which are required for qualification as preceptors. In Macao, there are no exemptions to the qualification standard for clinical preceptors. This standard has been in place for more than five years, such that all clinical preceptors are required to attend the preceptor training program. Individuals must successfully pass the assessment and evaluation tests before they can qualify to serve as clinical preceptors. Many studies have shown that clinical preceptors should act in a nurturing manner, treating students with compassion and care.⁵

Nevertheless, nursing students need to be informed of their weaknesses, and they need to know how they are perceived by their clinical preceptors during their mentoring periods and prior to their final evaluation in order to have the opportunity to improve their performance. Previous qualitative and quantitative studies have demonstrated that the clinical preceptors' behaviours may correlate with their nursing students' performances on evaluations.⁴ Thus, the purpose of this descriptive study was to explore the application of active learning among nursing students in year 2, year 3 and year 4 during their clinical practicum.

This study revealed that nursing students might improve their performance when an active learning model is supported in the clinical setting and in the classroom. Behaviour after receiving frequent reminders during the process of clinical practice is motivated. All of the clinical preceptors (11 in total) observed and agreed that the nursing students were active in asking questions, requesting to perform nursing skills, seeking answers to their questions and sharing their feedback.

Active learning, from the perspective of the preceptors and academic educator, refers to the ability of the nursing students to learn and practice their skills without being told, ordered or

pushed. The preceptors preferred that nursing students initiate asking questions. Occasionally, nursing skills, such as drawing blood or performing an ECG, were refused by the nursing students, who explained that they had performed the skills previously or stated that they were occupied with other duties. Furthermore, the clinical preceptors also had to attend to their other obligations. On busy days, preceptors might have forgotten to explain a procedure or ask for the students' comments. In those circumstances, the students were told to write their questions down and to ask the questions when the preceptors had completed their task or later during the shift. Details related to active learning might have included the elements given in Fig. 1.

In some cases, nursing students may need additional encouragement to be motivated to learn. Clinical preceptors should provide a detailed explanation of specific skills to students to guide their goals and to reduce their anxiety when they encounter problems.⁶ As noted by,⁷ immature students prefer to be guided and have their demonstrations performed by their educators; they may lack the motivation to initiate their own learning of skills. Other Chinese studies have indicated that the students' self-directed learning readiness and self-efficacy are important factors that affect their performance abilities.⁸

A study by⁹ revealed that clinical preceptors benefit from mentoring. Preceptors must provide a learning environment for students, a good opportunity for reciprocal learning and opportunities for professional development and improvement. One of the clinical preceptors in this study mentioned that she should review her knowledge of theory in order to fully answer the students' questions although she was already able to perform the skills easily and naturally. Another study with less experienced nurses reported that the nurses felt positively toward the students in the clinical

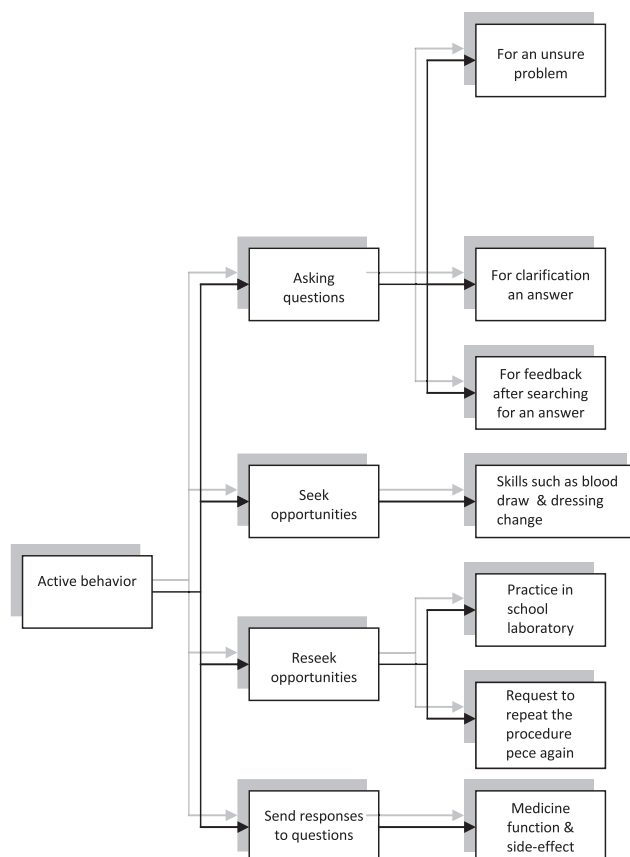


Fig. 1. Classification of active learning behaviour among nursing students.

practicum¹⁰ due to their limited experience. Preceptors demanded less of the students. In this case, the students might be more confident towards learning and participation in the performance of the nursing skills. A previous study performed in the bachelor's program for nursing students with 224 participants revealed that increasing the frequency of feedback and training helped to correct the incorrect perceptions among nursing students.¹¹ When requiring students to demonstrate active learning, the clinical preceptors also needed to maintain a consistently active attitude to support the students when they encountered difficulties in knowledge and skills during the practicum.¹² Students represent a young generation of new learners; they must be consistently reminded of what is expected of them. As undergraduate students, they are not independent during the first few years of college life.

Active behaviour in learning is particularly important during clinical practice. Clinical preceptors have busy schedules due to their routine daily work in addition to their mentorship duties. Thus, students who do not actively participate in requesting opportunities to perform skills may miss many opportunities, which diminishes learning and self-confidence. Furthermore, some students may even ignore opportunities to learn, assuming that performing fewer tasks will result in fewer mistakes, leading to a higher score on their evaluation. However, according to the concept of active learning, students are encouraged to practice their skills, even when they are unsure. They are encouraged to ask questions regarding their concerns and should not be afraid to reveal their weaknesses. Although the participants in this study were students who had limited experience in clinical practice, and in particular, in critical thinking, they were nevertheless willing to learn and seek opportunities to perform nursing skills. The clinical preceptors were not pleased when the students failed to engage in opportunities to practice their nursing skills. Some students mentioned that they had previously performed the indicated techniques; some students expressed that they would prefer the nurses to demonstrate the technique first.

Furthermore, some students stated that they had performed the technique previously and that they wanted their group mates to have the opportunity to practice the method as a rationale for their response. The students were reminded to not use these as excuses to avoid opportunities for learning and performing their nursing skills. They were also reminded to seek answers to their questions on their own if the clinical preceptors could not answer the questions immediately. Finally, the students were also reminded to explain the function and side effects of particular techniques and treatments in front of their clinical preceptors to show that they were actively learning the techniques and principles of the treatment.

On the basis of the authors' experience as an academic educator for over ten years, if the students exhibited the behaviour of active learning, then it was an indicator that they were performing well and engaged in lifelong learning. Active learning from the authors' perspective indicates that the students are self-motivated to learn via textbooks and articles as well as working with nurses through asking questions whenever the opportunities arise. Even if they are relatively weak in their knowledge or nursing skills, they are active in seeking the assistance of their academic educators and clinical preceptors. Furthermore, they can be active in repeatedly practicing their skills in the laboratory and requesting feedback. Students are given opportunities to learn and improve their knowledge and skills. Preceptors and teachers have the responsibility to remind the students to learn actively.

As another example, students who do not understand the functions and side effects of medications should be reminded of the consequences of poor knowledge of medication. Students should research the indications for different treatments and discuss their findings with the teacher on the following day during the

practicum. The students were generally willing to learn and apply active learning if they were frequently reminded to do this task by the preceptors. Knowing that active behaviour would help them to earn a good evaluation score, the students were self-motivated to seek learning opportunities and to demonstrate their knowledge of theory and nursing skills.

5. Conclusion

This study demonstrated that active learning is important for students and for clinical preceptors and mentors. Clinical preceptors enjoyed mentoring active-learning students. They felt more relaxed when teaching students who asked questions when they were unsure of their techniques. The clinical preceptors did not have to worry that the students were not learning the necessary information. Students in this study were very active in their efforts to seek opportunities to perform their nursing skills. These students were happy to see that they earned good scores on their evaluations and were pleased by the positive comments of the preceptors. The students were happier and more confident during the practicum. In addition, these students were still in their early twenties, and they needed motivation to remain active in learning. As clinicians and educators, we might sometimes forget to encourage or remind our students to conduct self-study or seek help. Thus, clinical preceptors should always remember to encourage their students to engage in a dynamic manner.

Conflicts of interest

All of the contributing authors declare no conflicts of interest.

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